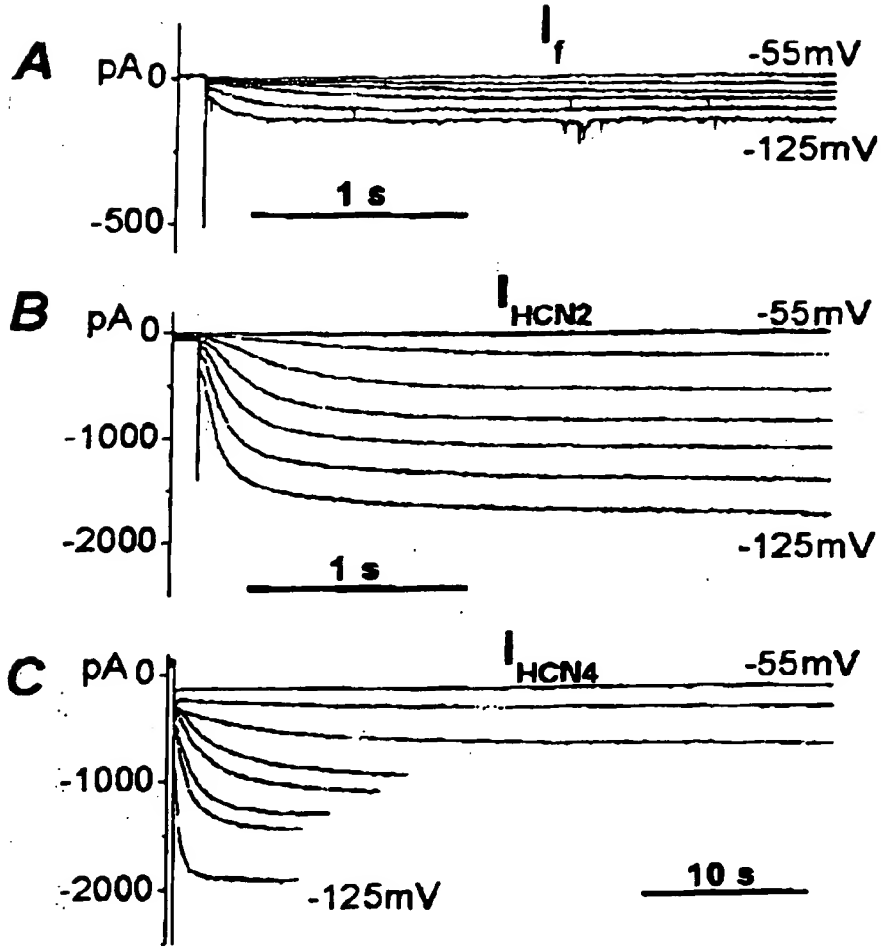

A
pA 0
-500
I_f
-55mV
-125mV
1 s
B
pA 0
-1000
-2000
I_{HCN2}
-55mV
-125mV
1 s
C
pA 0
-1000
-2000
I_{HCN4}
-55mV
-125mV
10 s

Figure 1

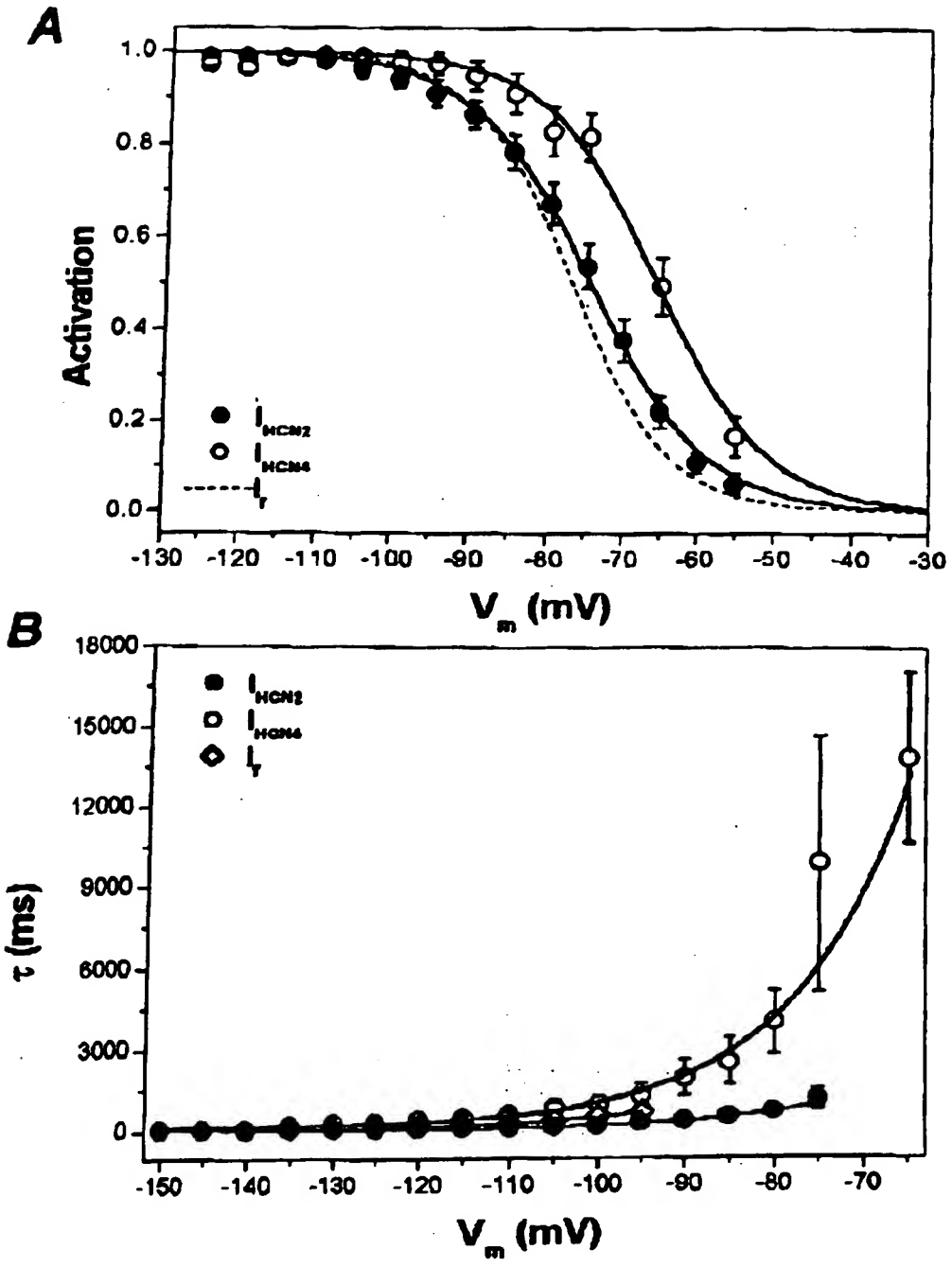

A
1.0
0.8
0.6
0.4
0.2
0.0
Activation
-130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30
V_m (mV)
B
18000
15000
12000
9000
6000
3000
0
τ (ms)
-150 -140 -130 -120 -110 -100 -90 -80 -70
V_m (mV)

Figure 2

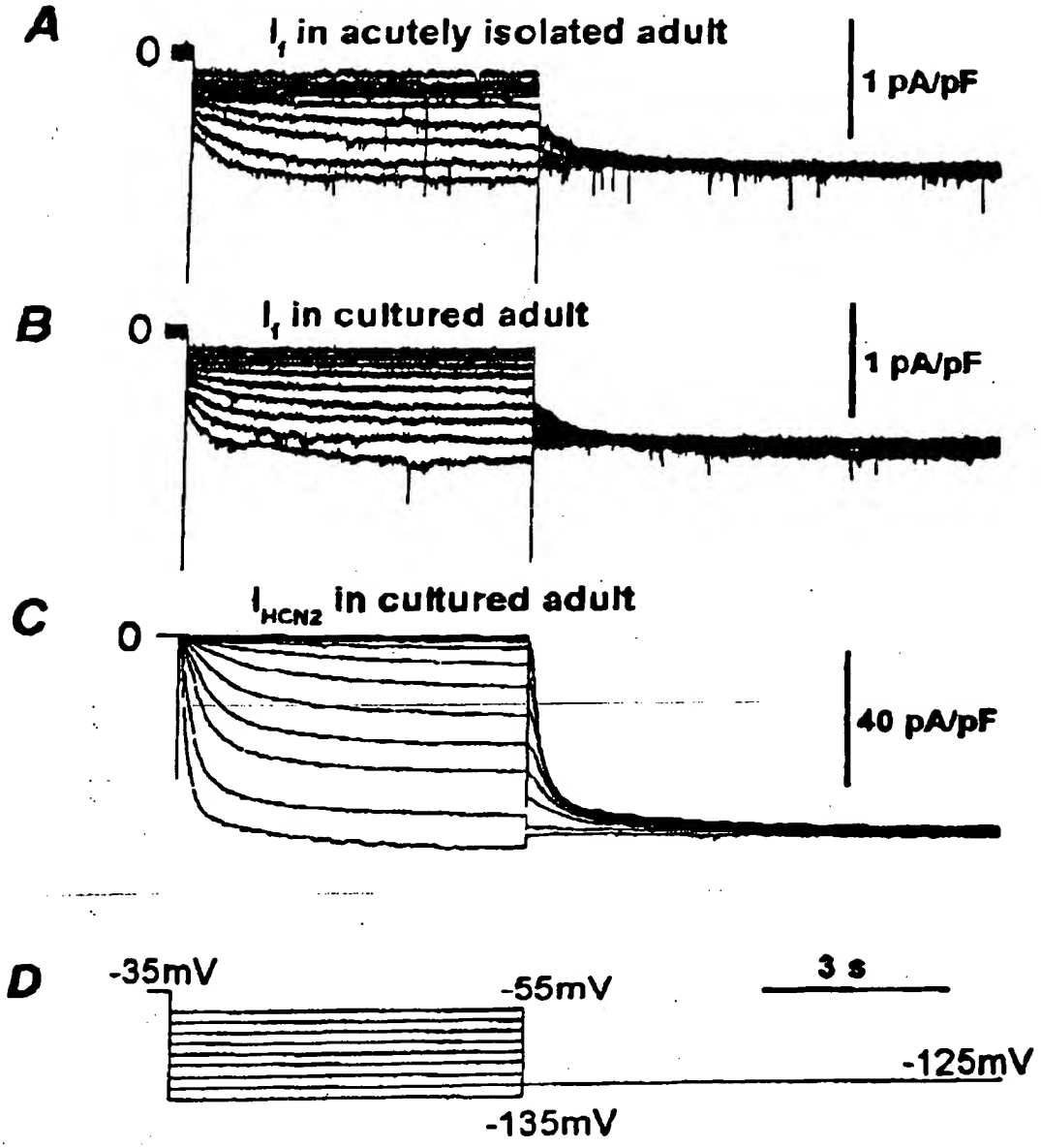

A
0
I_f in acutely isolated adult
1 pA/pF
B
0
I_f in cultured adult
1 pA/pF
C
0
I_{HCN2} in cultured adult
40 pA/pF
D
-35mV
-55mV
3 s
-125mV
-135mV

Figure 3

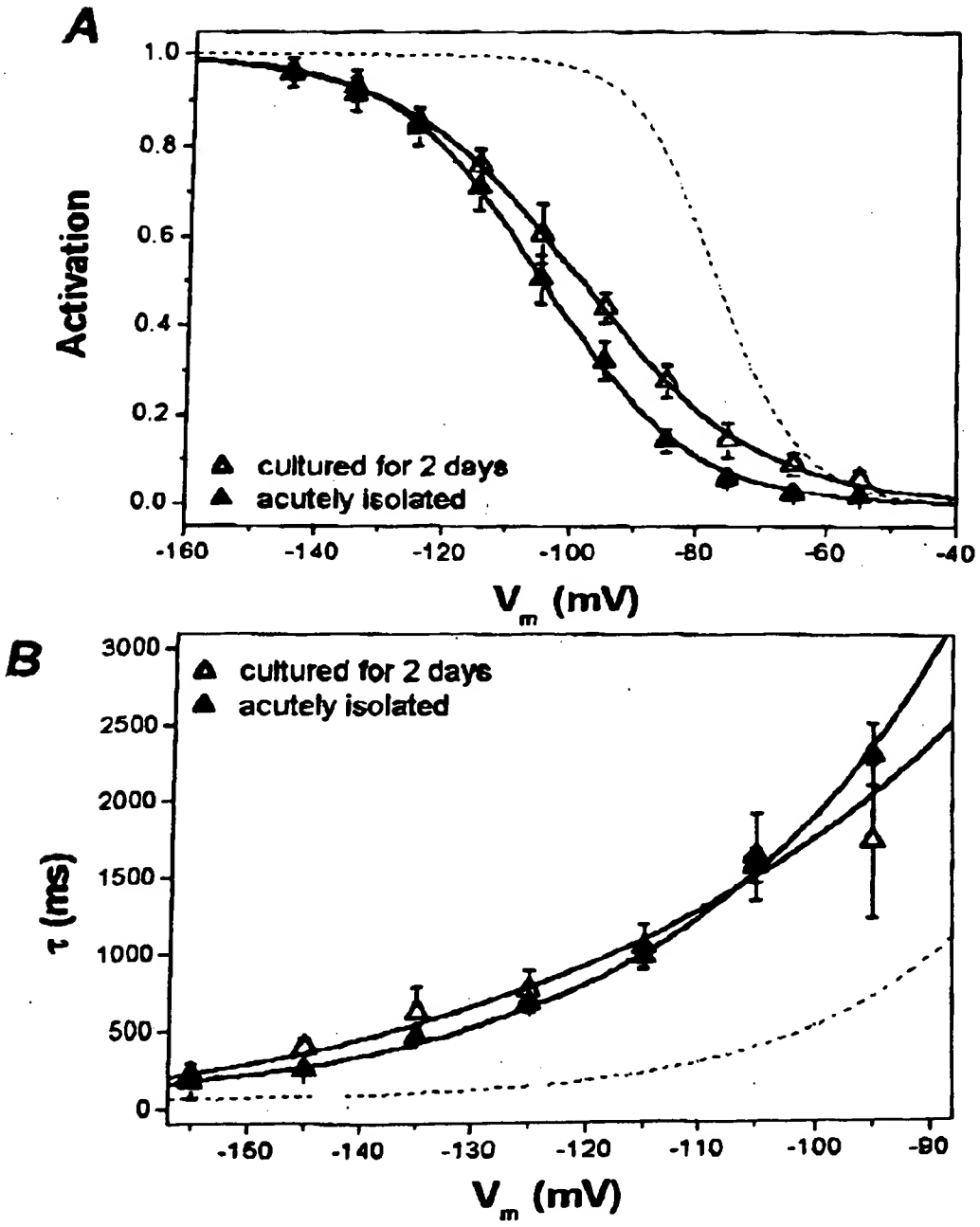

A
Activation
1.0
0.8
0.6
0.4
0.2
0.0
cultured for 2 days
acutely isolated
-160
-140
-120
-100
-80
-60
-40
V_m (mV)
B
τ (ms)
3000
2500
2000
1500
1000
500
0
cultured for 2 days
acutely isolated
-150
-140
-130
-120
-110
-100
-90
V_m (mV)

Figure 4

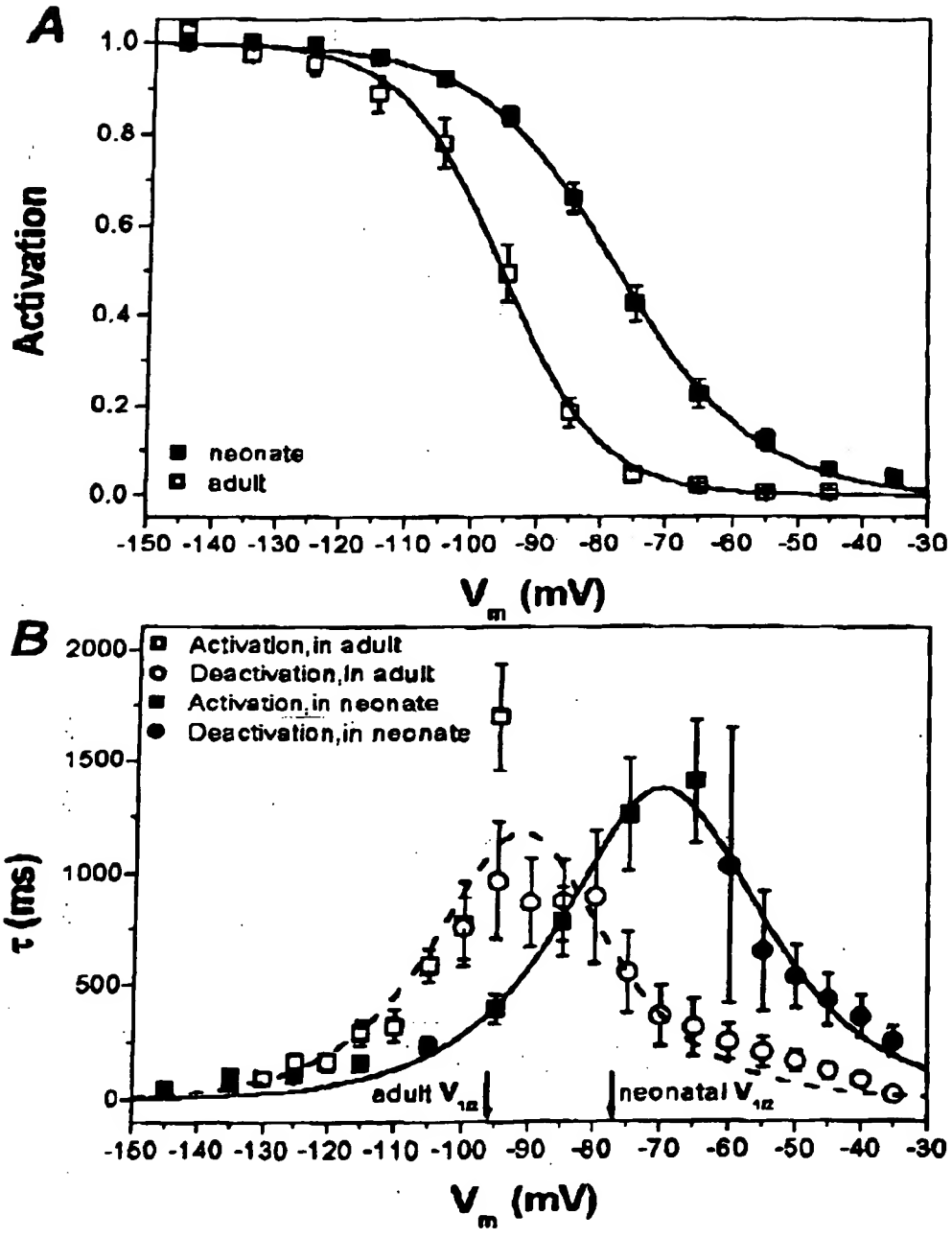

A
Activation
1.0
0.8
0.6
0.4
0.2
0.0
neonate
adult
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30
V_m (mV)
B
τ (ms)
2000
1500
1000
500
0
Activation,in adult
Deactivation,in adult
Activation,in neonate
Deactivation,in neonate
adult V_1/2
neonatal V_1/2
-150 -140 -130 -120 -110 -100 -90 -80 -70 -60 -50 -40 -30
V_m (mV)

Figure 5

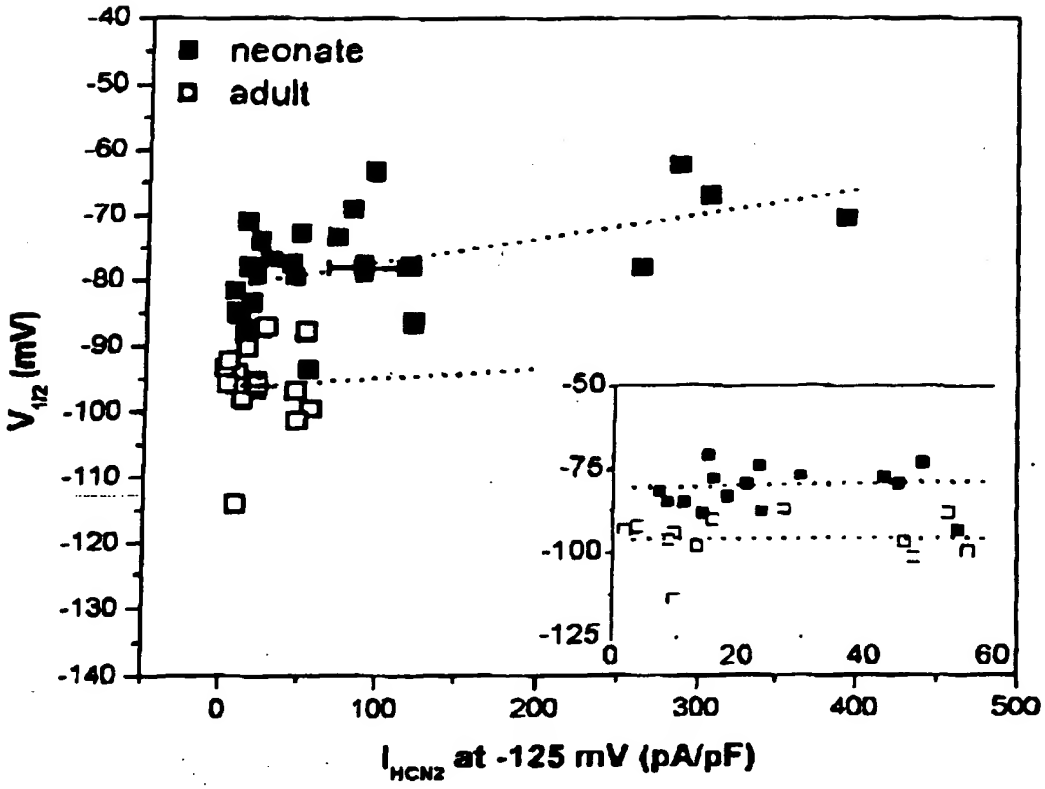


Figure 6

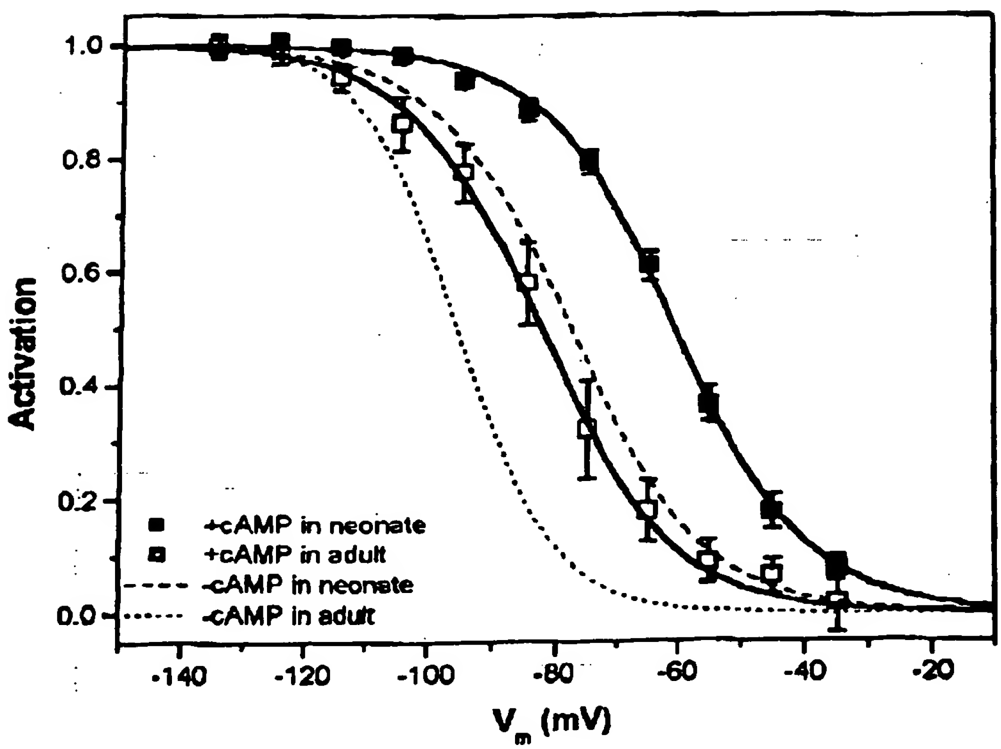


Figure 7

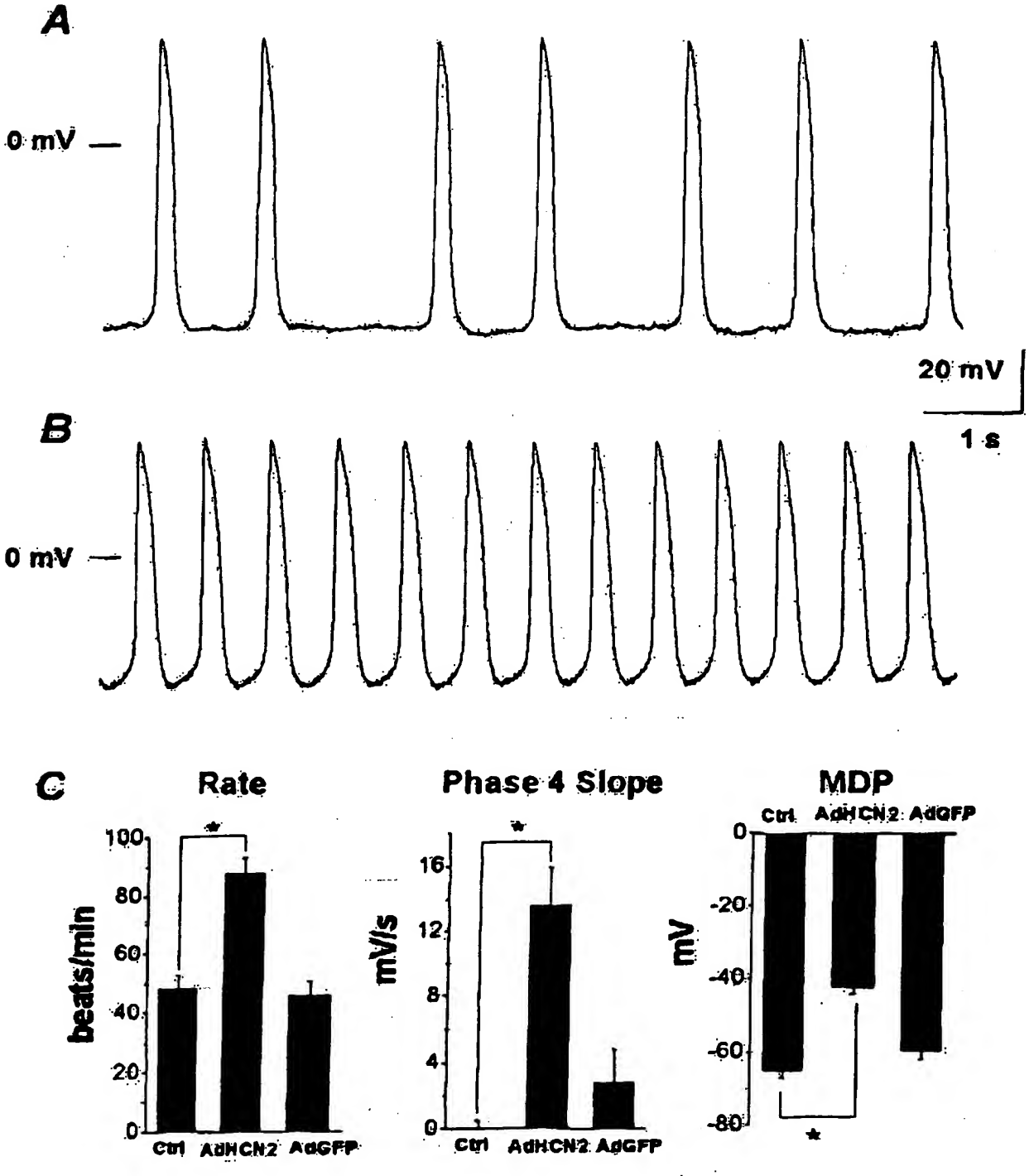

A
0 mV
20 mV
1 s
B
0 mV
C
Rate
beats/min
100
80
60
40
20
0
Ctrl
AdHCN2
AdGFP
Phase 4 Slope
mV/s
16
12
8
4
0
Ctrl
AdHCN2
AdGFP
MDP
Ctrl
AdHCN2
AdGFP
mV
0
-20
-40
-60
-80

Figure 8

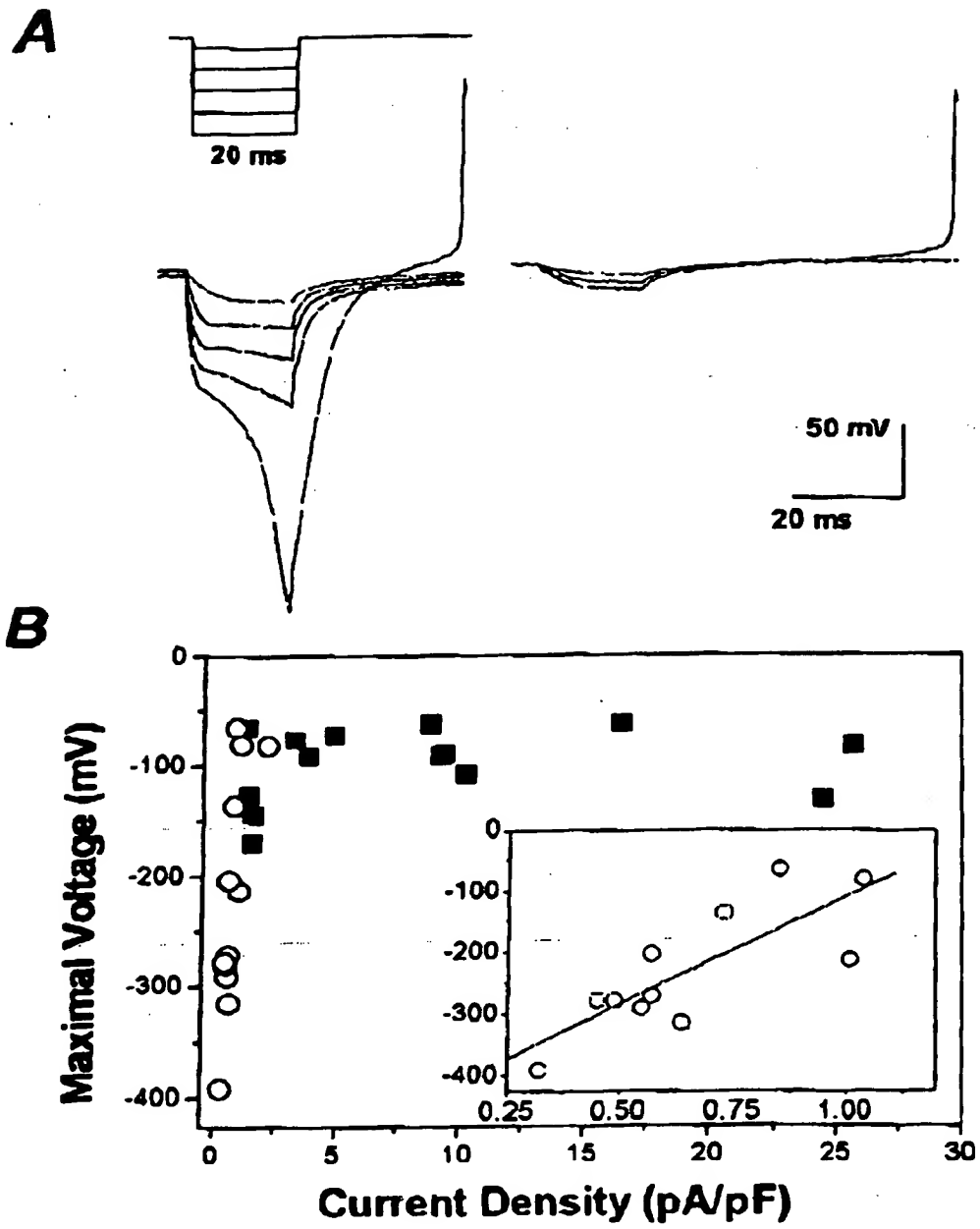

A
20 ms
50 mV
20 ms
B
Maximal Voltage (mV)
0
-100
-200
-300
-400
0
5
10
15
20
25
30
Current Density (pA/pF)
0
-100
-200
-300
-400
0.25
0.50
0.75
1.00

Figure 9

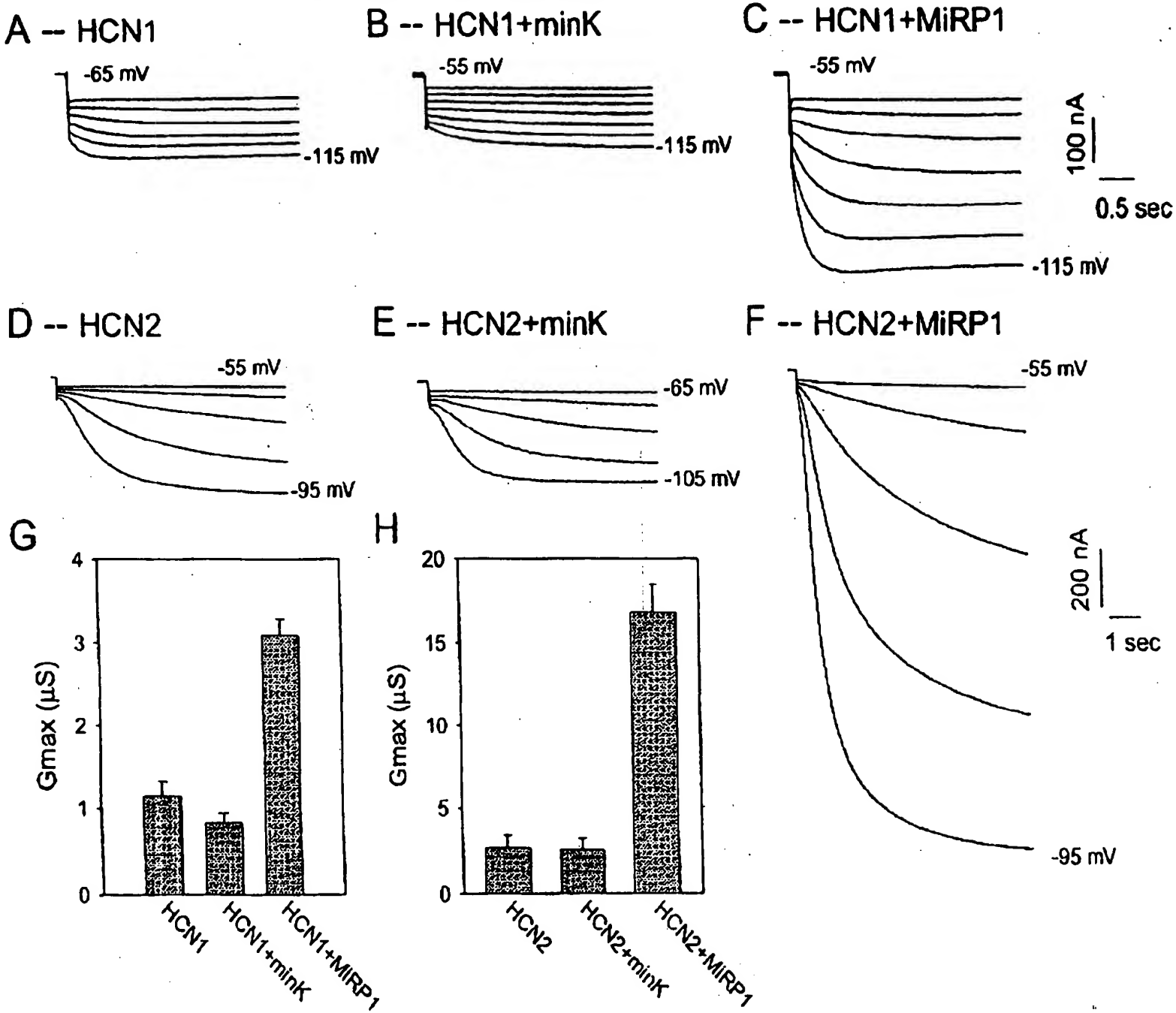
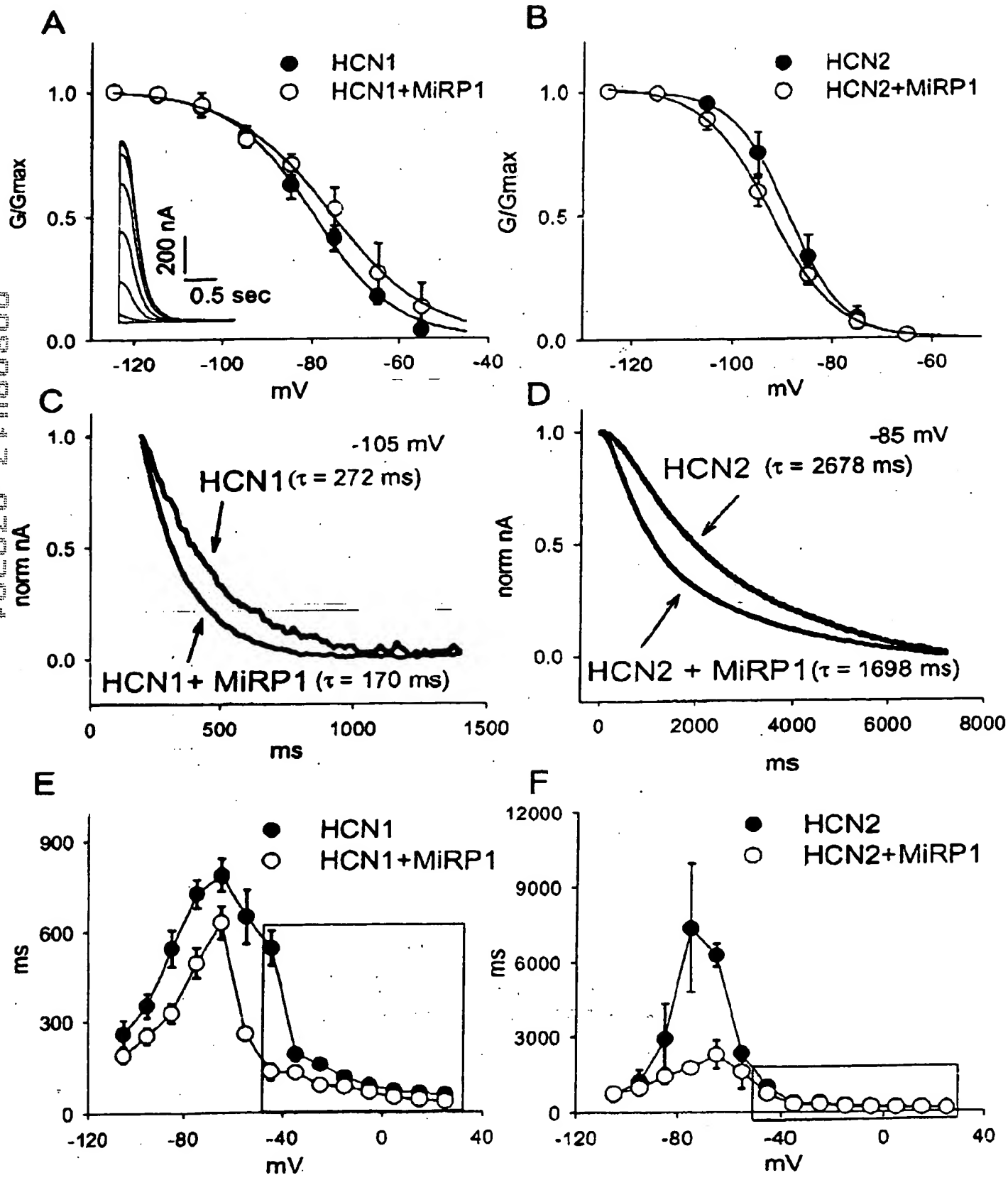
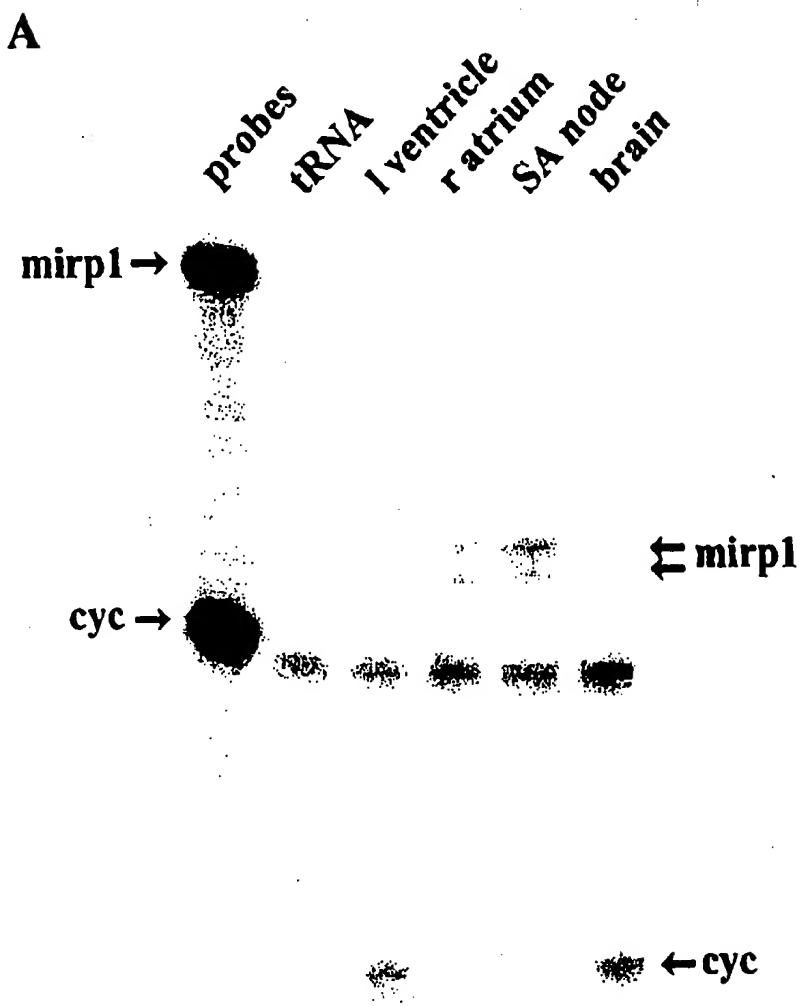


Figure 10

Figure 11


A
HCN1
HCN1+MiRP1
G/Gmax
1.0
0.5
0.0
200 nA
0.5 sec
-120
-100
-80
-60
-40
mV
B
HCN2
HCN2+MiRP1
G/Gmax
1.0
0.5
0.0
-120
-100
-80
-60
mV
C
-105 mV
HCN1 (τ = 272 ms)
HCN1+ MiRP1 (τ = 170 ms)
norm nA
1.0
0.5
0.0
0
500
1000
1500
ms
D
-85 mV
HCN2 (τ = 2678 ms)
HCN2 + MiRP1 (τ = 1698 ms)
norm nA
1.0
0.5
0.0
0
2000
4000
6000
8000
ms
E
HCN1
HCN1+MiRP1
ms
900
600
300
0
-120
-80
-40
0
40
mV
F
HCN2
HCN2+MiRP1
ms
12000
9000
6000
3000
0
-120
-80
-40
0
40
mV



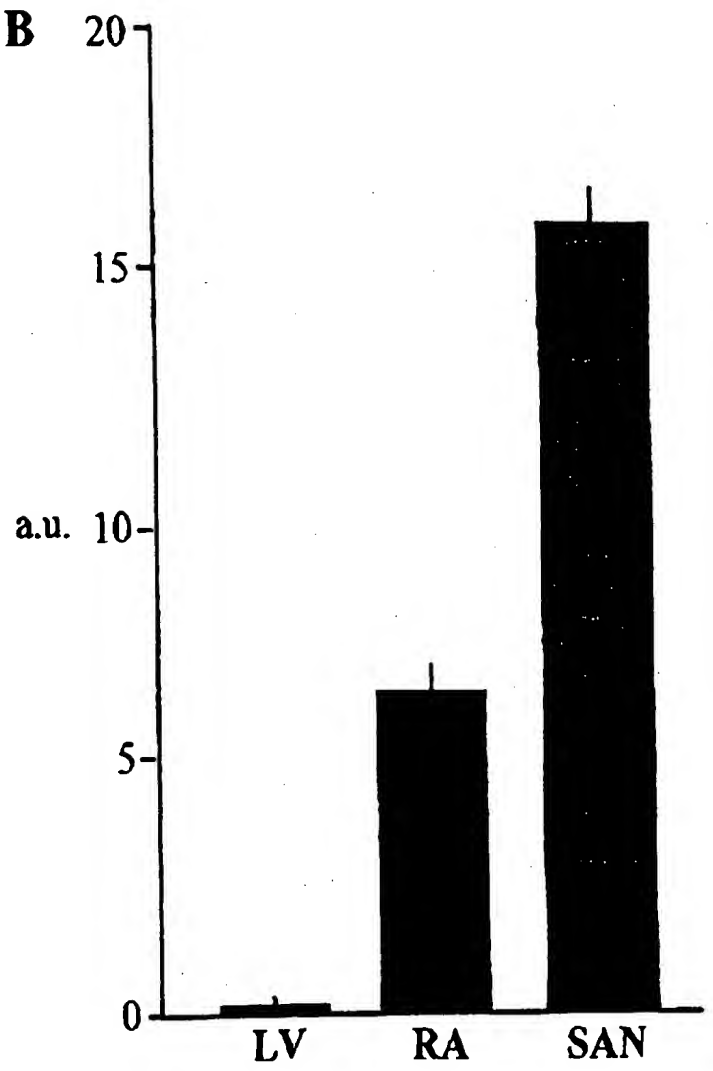
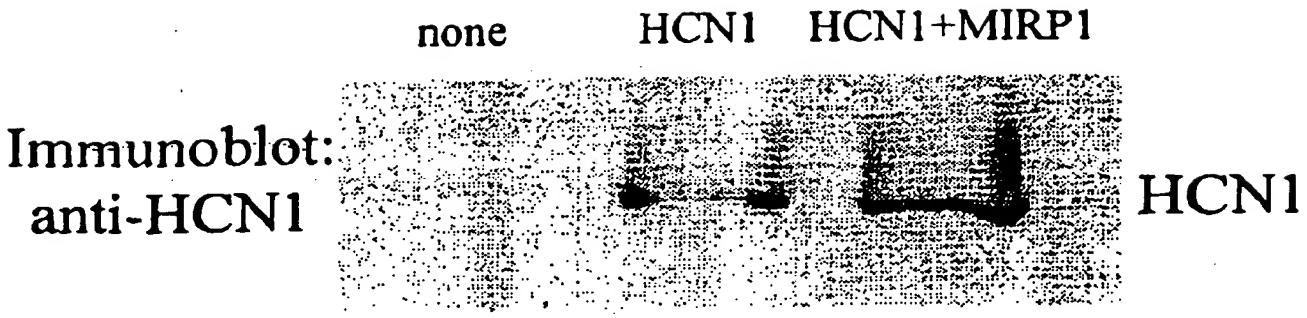
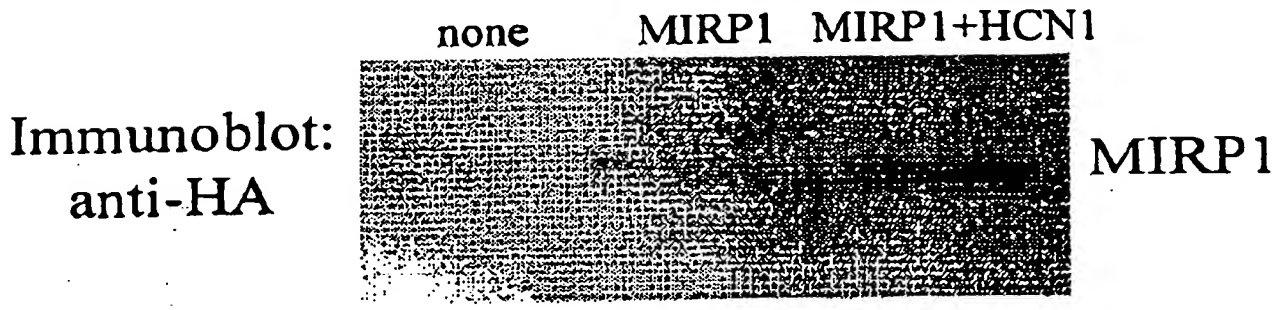


Figure 12

A



B



C

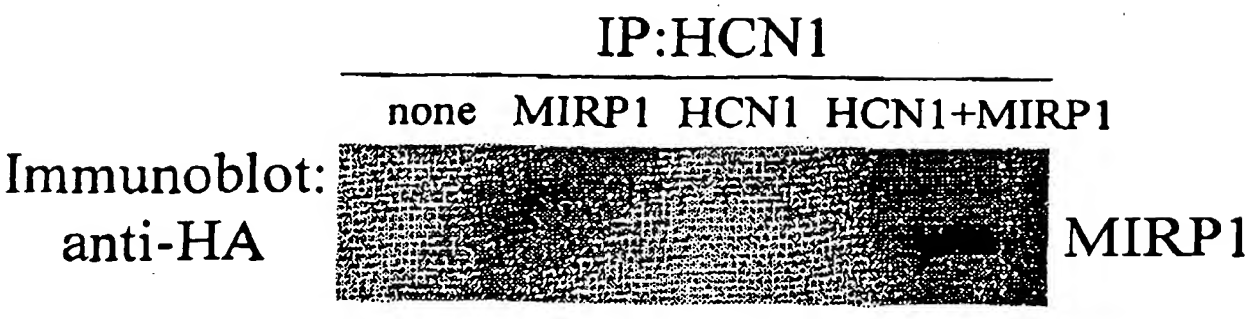


Figure 13

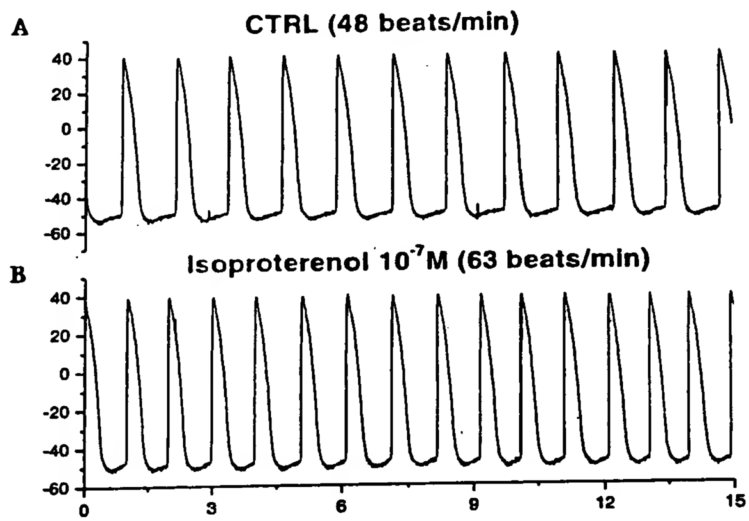

A
CTRL (48 beats/min)
40
20
0
-20
-40
-60
B
Isoproterenol 10-7M (63 beats/min)
40
20
0
-20
-40
-60
0
3
6
9
12
15

Figure 14

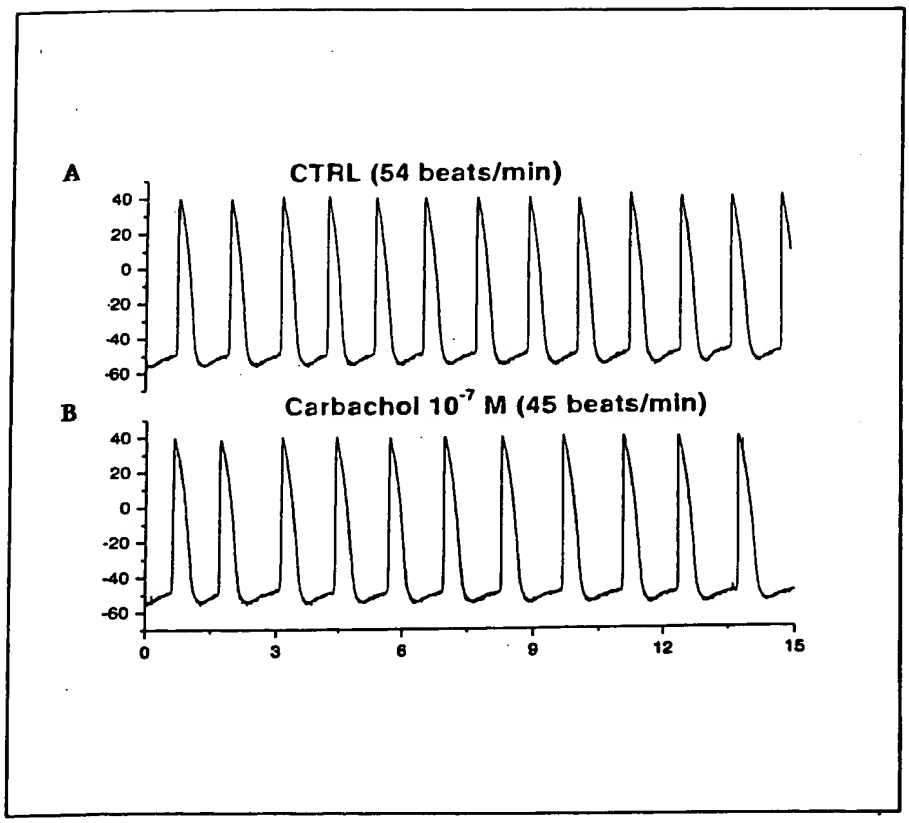

A
CTRL (54 beats/min)
40
20
0
-20
-40
-60
B
Carbachol 10-7 M (45 beats/min)
40
20
0
-20
-40
-60
0
3
6
9
12
15

Figure 15

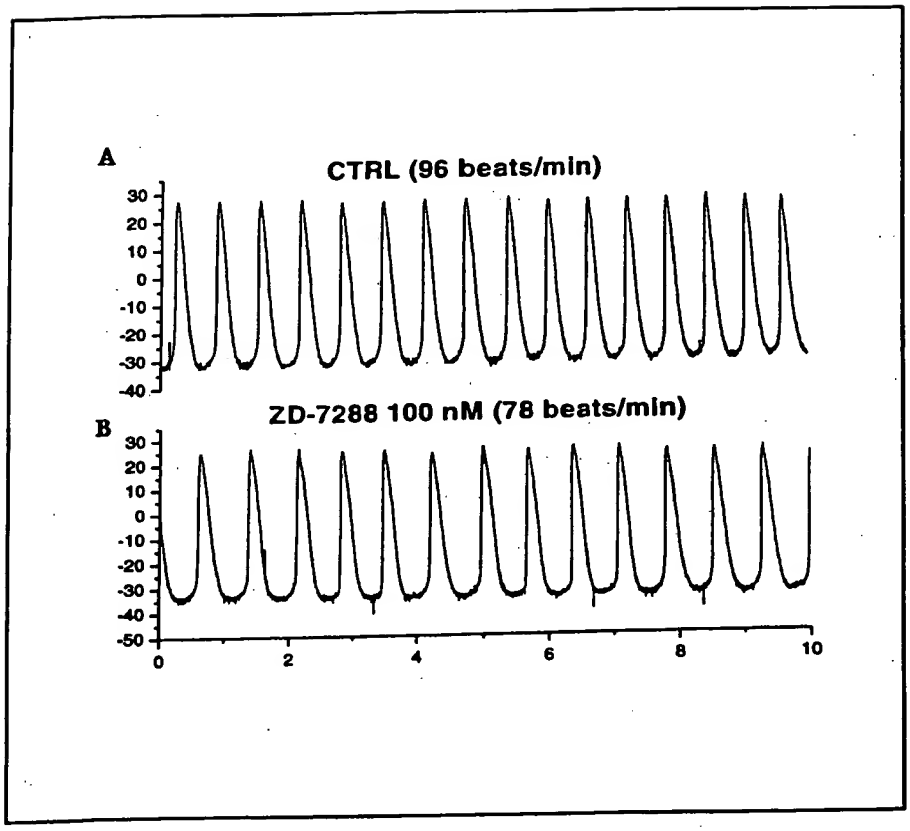

A
CTRL (96 beats/min)
30
20
10
0
-10
-20
-30
-40
B
ZD-7288 100 nM (78 beats/min)
30
20
10
0
-10
-20
-30
-40
-50
0
2
4
6
8
10

Figure 16

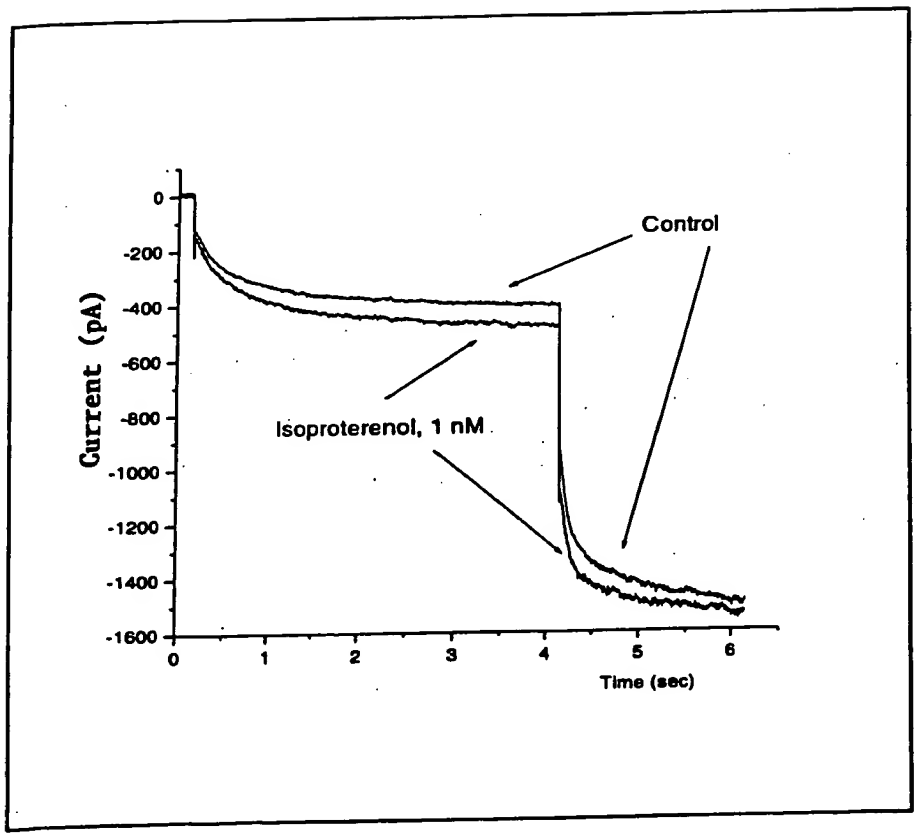

Control
Isoproterenol, 1 nM
Current (pA)
Time (sec)
0
-200
-400
-600
-800
-1000
-1200
-1400
-1600
0
1
2
3
4
5
6

Figure 17